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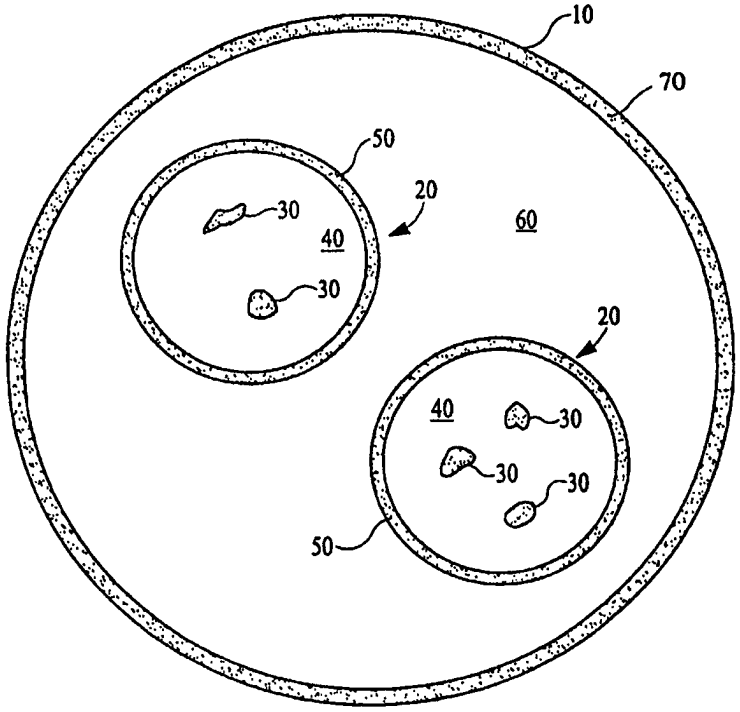
(54) Title: MONODISPERSE PREPARATIONS USEFUL WITH IMPLANTED DEVICES

(57) Abstract

An article (10) is disclosed that includes a core (60) and a selectively permeable coating (70) enclosing the core (60). The coating (70) includes a monodisperse polymer.



1. An article comprising:

a core; and

a selectively permeable coating enclosing said core, said coating comprising a monodisperse polymer.

2. The article of claim 1, wherein said polymer has a molecular weight of from about 1,000 to about 60,000 Da.

3. The article of claim 1, wherein said polymer has a molecular weight of from about 1,000 to about 10,000 Da.

4. The article of claim 1, wherein said polymer has a molecular weight of from about 1,000 to about 4,000 Da.

5. The article of claim 1, wherein said polymer comprises from about 10 to about 300 monomer units.

6. The article of claim 1, wherein said polymer comprises from about 10 to about 40 monomer units.

7. The article of claim 1, wherein said polymer comprises from about 20 to about 30 monomer units.

8. The article of claim 1, wherein said polymer is selected from the group consisting of homopolymers and heteropolymers.

9. The article of claim 1, wherein said polymer is selected from the group consisting of homopolyamino acids, heteropolyamino acids, homooligonucleotides and heterooligonucleotides.

10. The article of claim 1, wherein said polymer comprises amino acids selected from the group consisting of D-amino acids, L-amino acids and combinations thereof.

11. The article of claim 1, wherein said polymer comprises a polyamino acid having a length of from about 10 to about 300 amino acids.

12. The article of claim 1, wherein said polymer comprises a polyamino acid having a length of from about 10 to about 30 amino acids.

13. The article of claim 1, wherein said polymer comprises a polyamino acid.

14. The article of claim 1, wherein said polymer comprises a polylysine.

15. The article of claim 1, wherein said core comprises a hydrogel.

16. The article of claim 1, wherein said core comprises a gel selected from the group consisting of alginate, agar, collagen, chitosan, gelatin, and combinations thereof.

17. The article of claim 1, wherein said core comprises a gel selected from the group consisting of polyacrylamide, polyacrylate, polymethacrylate, and combinations thereof.

18. The article of claim 1, wherein said core comprises an aqueous solution.

19. The article of claim 1, further comprising a second selectively permeable coating on said first coating, said second coating comprising a monodisperse polymer.

20. The article of claim 19, wherein said monodisperse polymer of said second coating is different from the monodisperse polymer of said first coating.

21. The article of claim 1, wherein said coating further comprises a second monodisperse polymer.

22. A device comprising the article of claim 1, wherein said core further comprises a source of a therapeutic substance.

23. The device of claim 22, wherein said therapeutic substance comprises a cell.

24. The device of claim 23, wherein said cell is selected from the group consisting of primary tissue cells, cultured cell lines, genetically engineered cells, stem cells, and combinations thereof.

25. The device of claim 22, wherein said therapeutic substance comprises a drug.

26. The device of claim 22, wherein said therapeutic substance comprises a component capable of a producing a drug.

27. The device of claim 22, wherein said therapeutic substance comprises an islet.

28. The device of claim 22, further comprising a second selectively permeable coating on said first selectively permeable coating, said second selectively permeable coating comprising a monodisperse polymer.

29. The device of claim 28, wherein said second monodisperse polymer differs from said first monodisperse polymer.

52. The device of claim 39, wherein said agent comprises a reagent selected from the group consisting of energy absorbing reagents, spin resonance reagents, nuclear magnetic resonance reagents, x-ray reagents and combinations thereof.

53. The device of claim 39, wherein said agent comprises a fluorescence reagent.

54. The device of claim 53, wherein said fluorescence reagent exhibits a fluorescence intensity, an emission spectrum, an excitation spectrum, or an excited state lifetime in the presence of said analyte that is different from its fluorescence intensity, emission spectrum, excitation spectrum, or excited state lifetime in the absence of said analyte.

55. The device of claim 53, wherein said fluorescence reagent comprises an energy-accepting donor molecule and an energy-absorbing acceptor molecule, the excited state energy level of the donor overlapping with the excited state energy level of the acceptor.

56. The device of claim 53, wherein said reagent is retained within said device while said analyte is allowed to diffuse into and out of said device.

57. The device of claim 39, wherein said device is implantable in an individual.

58. An in vivo method for determining an analyte in the body fluids of an individual comprising the steps of

a) placing the device of claim 39 in communication with the body fluids of said individual suspected of containing said analyte in such a way that once in place said device does not exit the skin of the individual,

said agent comprising a fluorescence reagent for detecting said analyte that reversibly binds to said analyte,

said fluorescence reagent having a fluorescence intensity, an emission spectrum, an excitation spectrum, or an excited state lifetime in the presence of said analyte that is different from its fluorescence intensity, emission spectrum, excitation spectrum, or excited state lifetime in the absence of said analyte,

said device being configured to retain said fluorescence reagent while allowing said analyte to diffuse into and out of said device;

b) transdermally illuminating said device; and

c) measuring the fluorescence intensity, emission spectrum, excitation spectrum, or excited state lifetime of said fluorescence reagent relative to the fluorescence intensity, emission spectrum, excitation spectrum, or excited state lifetime of said fluorescence reagent in the absence of said analyte; and

d) correlating the change in fluorescence intensity, emission spectrum, excitation spectrum, or excited state lifetime of said fluorescence reagent with the presence or amount of said analyte in said individual.

59. The method of claim 58 wherein said analyte is a carbohydrate.

60. The method of claim 58 wherein said carbohydrate is glucose or a derivative thereof.

61. An in vivo method for determining an analyte in the body fluids of an individual comprising the steps of

a) placing the device of claim 39 in communication with the body fluids of said individual suspected of containing said analyte,

said agent comprising a fluorescence reagent for detecting said analyte that reversibly binds to said analyte,

said device being configured to retain said fluorescence reagent while allowing analyte to diffuse into and out of said device,

said fluorescence reagent comprising an energy-absorbing donor molecule and an energy-absorbing acceptor molecule, the excited state energy level of the donor overlapping with the excited state energy level of the acceptor;

b) transdermally illuminating said device so as to

i) excite the donor or

ii) excite both the donor and acceptor; and

c) measuring the fluorescence from said fluorescence reagent associated with the presence of said analyte in said individual by determining the extent to which non-radiative fluorescence resonance energy transfer occurs between the donor and the acceptor upon binding,

said non-radiative fluorescence resonance energy transfer being determined by measuring

i) the ratio of the fluorescence signal at two emission wavelengths, one of which is due to donor emission and the other of which is due to acceptor emission, when only the donor is excited,

ii) the ratio of the fluorescence signal due to the acceptor following donor excitation and the fluorescence signal due to the acceptor following acceptor excitation,

iii) a change in donor lifetime,

iv) quenching of donor fluorescence, or

v) an enhancement of acceptor fluorescence intensity; and

d) correlating said non-radiative fluorescence resonance energy transfer with the presence or amount of said analyte in said individual.

62. A method of making an article comprising:

applying a selectively permeable monodisperse polymer coating on a core.